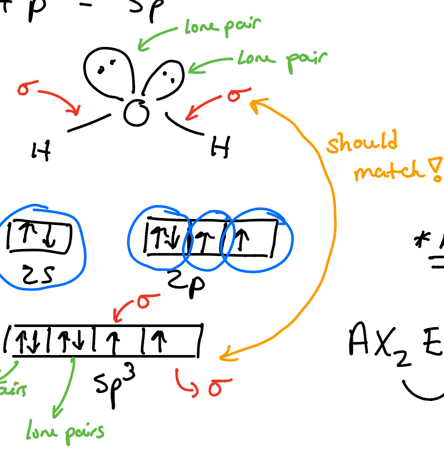
# Hybridization part 2:

Go back on $sp^3$

↳ $s + p + p + p = sp^3$

$H_2O$ :




**Oxygen**

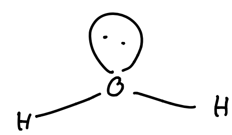
Ground state:

Hybridization

* no need to excite

$AX_2E_2$

H — O — H





* Electron arrangement: tetrahedral

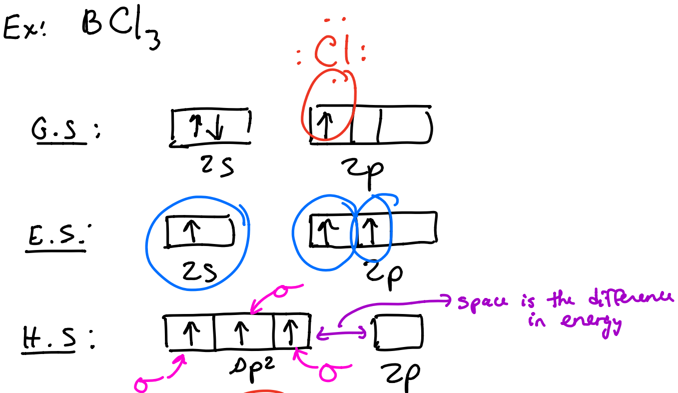
* molecular shape: bent

## $Sp^2$:

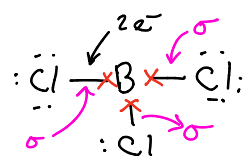
↳ Combining one s and two p

Total v.e$^-$ = 24

Ex: $BCl_3$




↳ combining s + p + p = sp²



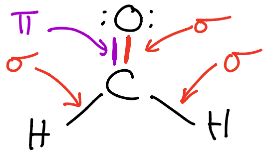

Lewis structure

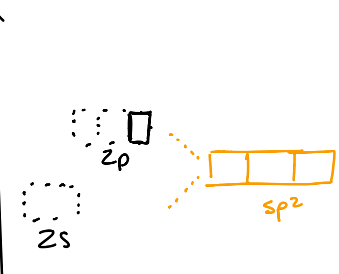
remaing $e^-$ = 24 − 24 = 0

↑ total ↑ total

**Ex:** $H_2CO$

Total v.e⁻ = 12

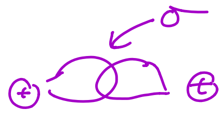



Carbon

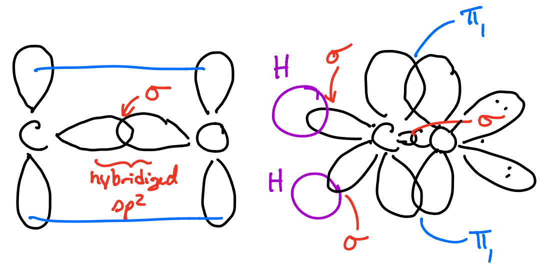
G.S: [↑↓] 2s [↑|↑| ] 2p

E.S: [↑] 2s [↑|↑|↑] 2p (σ, σ, σ, π)




H.S: [↑|↑|↑] $sp^2$ (σ bonds) [↑] 2p (π bond)

↳ combining s + p + p = $sp^2$



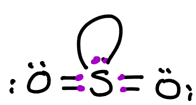

**Ex:** $SO_2$ total ve = 18 e⁻'s

GS

S ⇒ 3rd period
6 v.e⁻'s

16 e⁻ used
2 e⁻ remaining
18 total

Ground state: [↑↓] 3s [↑↓|↑|↑] 3p [ | | | | ] 3d




VSEPR = $AX_2E_1$
<120 Bent

Excited state: do we need it?

4 e⁻'s shared
2 single e⁻'s ⇒ we need 4 single e⁻'s
yes excite!

2+1 = 3 e⁻ Groups
[ | | ] s p p
sp²
120°

Excited [↑↓] 3s [↑|↑|↑] 3p [↑| | | | ] 3d

How many sigma bonds and lone pairs? 2 σ
+ 1 Lone pair
3 ⇐ 3 hybrid orbitals are needed

hybridized state: lone pair σ σ
[↑↓|↑|↑] $sp^2$ π [↑] 3p π [↑| | | | ] 3d